

Date: Mon, 14 Mar 94 04:30:41 PST
From: Ham-Space Mailing List and Newsgroup <ham-space@ucsd.edu>
Errors-To: Ham-Space-Errors@UCSD.Edu
Reply-To: Ham-Space@UCSD.Edu
Precedence: Bulk
Subject: Ham-Space Digest V94 #57
To: Ham-Space

Ham-Space Digest Mon, 14 Mar 94 Volume 94 : Issue 57

Today's Topics:

 ANS-071 BULLETINS
 ARLK010 Keplerian data
 new stsplus??
 STS-62 Orbital State Vectors Rev #148 (pre-OMS3)
 Tokyo HiPower HL-90U Amp

Send Replies or notes for publication to: <Ham-Space@UCSD.Edu>
Send subscription requests to: <Ham-Space-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Space Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-space".

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: Sun, 13 Mar 1994 10:17:34 MST
From: ihnp4.ucsd.edu!library.ucla.edu!psgrain!nntp.cs.ubc.ca!alberta!ve6mgs!
usenet@network.ucsd.edu
Subject: ANS-071 BULLETINS
To: ham-space@ucsd.edu

SB SAT @ AMSAT \$ANS-071.01
W3IWI EXPLAINS SAT PROPAGATION

HR AMSAT NEWS SERVICE BULLETIN 071.01 FROM AMSAT HQ
SILVER SPRING, MD MARCH 12, 1994
TO ALL RADIO AMATEURS BT
BID: \$ANS-071.01

W3IWI Explains A Propagation Phenomenon Observed By IT9XXS

Giovanni Mazzola (IT9XXS) posed a question about a propagation phenomenon
he has been noticing on K0-23, K0-25, U0-22 and other digital satellites.

He reported that he has regularly observed that at the end of the pass, when the satellite is between 0 and -2 degrees elevation, the signal exhibits three strong peaks. During the pass it may be S4 but when the three peaks in signal strength occur, they are over S9. After that he loses the signal altogether. He notes that he has a good horizon, looking out to the sea to the north.

Ton Clark (W3IWI) offers the following explanation: What IT9XXS is observing is classic and very predictable. It is the result of two physical effects: atmospheric refraction and "Lloyd's Mirror" reflections.

The earth's atmosphere bends the signals so that your "radio" horizon is below the physical horizon. The refractive index of the air is about 300 parts per million different from unity depending on the temperature and water vapor content of the air. This is precisely the reason that most line-of-sight computations of terrestrial paths increase the effective radius of the earth by about 1.33. Under some tropospheric conditions like when the temperature increases with height and/or when anomalous water vapor content is present, ducting can occur and VHF/UHF paths may extend to thousands of kilometers. This is especially true of over-water paths like the frequent duct that occurs between southern California and Hawaii or between Italy and Spain. Since the path in question is over water, this is probably the reason signals are received from the satellite when it is below the apparent horizon.

The second effect that is occurring is a reflection of the signals from the water, so the antenna is receiving two different signals. In optics this is often called the "Lloyd's mirror" effect. When the signal is reflected, its phase is changed by 180 degrees, so the direct and reflected signals arrive at the antenna out of phase and cancel at the horizon. At other elevations, the two signals traverse different paths so the phase difference of the direct and reflected signals varies, and the signals may either add constructively (increasing the signal strength) or destructively (causing a null). If the angles at which maxima and minima signal were known, it would be possible to compute the height of receiving antenna above the level of the sea (reflector).

This reflection effect was first seen in about 1947 when some Australians observed the radio "star" Cygnus-A from an antenna atop a sea cliff. The fact that they observed deep nulls allowed them to demonstrate that Cygnus-A was a compact object, smaller than a few arc-minutes in diameter and not a large-scale feature of the previously discovered radiation from our Milky Way galaxy. This work was done at VHF frequencies not far from our 2M amateur band.

[The AMSAT News Service (ANS) would like to thank Tom Clark (W3IWI) for this explanation and IT9XXS for posing the question.]

/EX

SB SAT @ AMSAT \$ANS-071.02

STS-59 SAREX INFO

HR AMSAT NEWS SERVICE BULLETIN 071.02 FROM AMSAT HQ

SILVER SPRING, MD MARCH 12, 1994

TO ALL RADIO AMATEURS BT

BID: \$ANS-071.02

N5QWL Provides A "Fact" Sheet For The Upcoming STS-59 SAREX Mission

Shuttle Amateur Radio Experiment (SAREX) Fact Sheet

STS-59 Space Shuttle Endeavour

When: Planned Launch April 7, 1994 at 12:07 UTC for 9 days of 2M operations.

Where: Earth Orbit. Altitude 220 kilometers, with radio coverage of latitudes from 70 degrees North to 70 degrees South. We are in one of the lowest altitude orbits ever flown by the shuttle, so pass times will be shorter than usual.

Operators: Dr. Jay Apt (N5QWL) and Dr. Linda Godwin N5RAX. N5QWL is the commander of the Blue Shift aboard Endeavour and will operate the shuttle systems during the "night" shift, while N5RAX is the Payload Commander, responsible for overall operation of three large radars in the shuttle's cargo bay during the "day" shift.

Modes: FM Voice

VOICE CALL SIGNS: N5QWL and N5RAX

Packet (Beacons giving daily mission activities daily if we get a chance, and robot QSOs -- successful connects will be issued a contact number by the robot) PACKET CALL SIGN: W5RRR-1

Frequencies: We will operate split.

PLEASE DO NOT TRANSMIT ON THE DOWNLINK FREQUENCY!

VOICE: Downlink (shuttle transmits) on 145.55 MHz

Uplink (ground transmits) on 144.91, 144.93, 144.95, 144.97, and 144.99 (except over Europe) - we'll listen on those 5 frequencies to spread out the pileup a bit.
Uplink for Europe only: 144.80, 144.75, 144.70

Successful QSOs on voice will be facilitated by using standard international phonetics for your call sign.
We will not answer any stations using non-standard

phonetics. Use your entire call sign -- we log with an audio tape recorder. Do not use our call sign -- passes are very short, and we want to work as many folks as possible.

PACKET: Downlink (shuttle transmits) on 145.55
Uplink (ground transmits) on 144.49 (worldwide)

If you can, decrease your radio's deviation to 3 KHz (most are initially set at 5 KHz) and compensate for the Doppler shift. If you cannot, wait until a minute or 90 seconds after we come over your horizon to transmit -- that will put you within our IF. If a station transmits without following these suggestions, we just hear what sounds like a noisy carrier. The above applies to both voice and packet.

QSL via: ARRL, ATTN: STS-59 QSLs, 225 Main Street, Newington, CT 06111, USA. Include a self-addressed stamped envelope (SASE). Non-US stations include a self addressed envelope with \$0.50 of US postage affixed or appropriate IRCs. Include the Callsign worked, Date, UTC, Mode, and Frequency. For packet contacts, include the QSO number issued by the robot. SWL QSL's: Include the Callsign heard, Date, UTC, Mode, and Frequency.

Information during the mission: AMSAT bulletins, Compuserve, Genie, Prodigy, local packet bulletin boards, ARRL bulletins, and HF voice from NASA Johnson Space Center ARC, Houston, Texas, W5RRR, or NASA Goddard Spaceflight Center ARC, Greenbelt, Maryland, WA3NAN, frequencies listed below.

W5RRR may be found on or near: 7.215, 14.280, 21.360, and 28.400 MHz.

WA3NAN retransmits NASA Select Audio and SAREX bulletins simultaneously on or near 3.860, 7.185, 14.295, 21.395, and 28.650 MHz.

The NASA Info BBS at Johnson Space Center, Houston, will also carry Keplerian elements and SAREX bulletins. (713) 483-2500, 1200 baud, 8-N-1. At the "ENTER NUMBER:" prompt, type 62511 <return> and log onto the BBS. The Keps and bulletins will be in the welcome message. Disconnect rapidly to facilitate access by others.

Operations Notes: If you have a packet QSO number issued to you by the robot, don't try to get another one! Our on-board program drops the duplicates anyhow, and all you are doing is making it harder for the other folks. We'll issue you a QSL card if you appear in the "heard" list on

the TNC and we have issued you a QSO number...that's a
2-way contact, AND REMEMBER, THIS IS ONLY A HOBBY!

N5QWL will be asleep over most USA passes, and N5RAX will be busy with assigned duties for most daylight US passes, so try us on packet over the USA if the sun is up. Remember, our packet call sign is W5RRR-1. We'll try to work voice (1) when we are not otherwise engaged, and (2) at night or when the ground is cloudy (we are generally busy taking pictures of the Earth during clear daylight passes).

If I can get to it, I'll activate the SAREX about 3 hours into the mission; deactivation will occur at about 8 days, 17 hours after launch (unless we get a one-day science mission extension, then it will be deactivated at about 9 days, 17 hours after launch).

Prelaunch Keplerian Elements, courtesy of Gil Carman (WA5NOM) of the JSC ARC):

STS-59

1	00059U	94097.74947238	.00221188	00000-0	11303-3 0	70
2	00059	57.0053	276.3038	0009259	269.9963 90.0094	16.19806752 56

Satellite: STS-59

Catalog number: 00059

Epoch time: 94097.74947238 = (07-APR-94 17:59:14.41 UTC)

Element set: 007

Inclination: 57.0053 deg

RA of node: 276.3038 deg

Space Shuttle Flight STS-59

Eccentricity: .0009259

Prelaunch Element set JSC-007

Arg of perigee: 269.9963 deg

Launch: 07-APR-94 12:07 UTC

Mean anomaly: 90.0094 deg

Mean motion: 16.19806752 rev/day

G. L. Carman

Decay rate: 2.21188e-03 rev/day^2

NASA Johnson Space Center

Epoch rev: 5

Checksum: 327

[The AMSAT News Service (ANS) would like to thank N5QWL for in this
bulletin item.]

/EX

SB SAT @ AMSAT \$ANS-071.03

AO-13 OPERATIONS NET SCHEDS

HR AMSAT NEWS SERVICE BULLETIN 071.03 FROM AMSAT HQ

SILVER SPRING, MD MARCH 12, 1994

TO ALL RADIO AMATEURS BT

BID: \$ANS-071.03

Current AMSAT Operations Net Schedule For AO-13

AMSAT Operations Nets are planned for the following times. Mode-B Nets are conducted on AO-13 on a downlink frequency of 145.950 MHz. If, at the start of the OPS Net, the frequency of 145.950 MHz is being used for a QSO, OPS Net enthusiasts are asked to move to the alternate frequency of 145.955 MHz.

Date	UTC	Mode	Phs	NCS	Alt NCS
19-Mar-94	1730	B	073	W5IU	WA5ZIB
26-Mar-94	2130	B	084	WA5ZIB	W5IU

Any stations with information on current events would be most welcomed. Also, those interested in discussing technical issues or who have questions about any particular aspect of OSCAR statellite operations, are encouraged to join the OPS Nets. If neither of the Net Control Stations show up, any participant is invited to act as the NCS.

AO-13 ZRO Tests For March 1994

The following schedule of Mode "B" tests were chosen for convenient operating times and favorable squint angles. The tests can be heard on 145.840 MHz. Andy McAlister (WA5ZIB) will conduct all the tests. Mode "JL" tests will no longer occur due to the failure of AO-13's 70CM transmitter.

Day	Date (UTC)	Time	Areas covered
Saturday	Mar. 19, 1994	1930 UTC	NA, SA, Europe, Africa
Saturday	Mar. 26, 1994	2315 UTC	NA, SA

Note that the dates and days are shown in "UTC". Any changes will be announced as soon as possible via the AMSAT HF and AO-13 Operations Nets.

All listener reports with date of test and numbers copied should be sent to Andy MacAllister (WA5ZIB), AMSAT V.P. User Operations, 14714 Knights Way Drive, Houston, TX 77083-5640. A report will be returned verifying the level of accurate reception. An S.A.S.E. is appreciated but not required.

/EX

SB SAT @ AMSAT \$ANS-071.04
WEEKLY OSCAR STATUS REPORTS

HR AMSAT NEWS SERVICE BULLETIN 071.04 FROM AMSAT HQ
SILVER SPRING, MD MARCH 12, 1994
TO ALL RADIO AMATEURS BT

BID: \$ANS-071.04

Weekly OSCAR Status Reports: 12-MAR-94

A0-13: Current Transponder Operating Schedule:

L QST *** A0-13 TRANSPONDER SCHEDULE *** 1994 Jan 31-Apr 04

Mode-B : MA 0 to MA 90 |

Mode-BS : MA 90 to MA 120 |

Mode-S : MA 120 to MA 145 |<- S transponder; B trsp. is OFF

Mode-S : MA 145 to MA 150 |<- S beacon only

Mode-BS : MA 150 to MA 180 | Blon/Blat 180/0

Mode-B : MA 180 to MA 256 |

Omnis : MA 230 to MA 30 | Move to attitude 240/0, Apr 04

[G3RUH/DB20S/VK5AGR]

F0-20: The following is the current schedule for transponder operations:

ANALOG MODE:

23-MAR-94 7:52 -TO- 30-MAR-94 8:15 UTC

DIGITAL MODE: Unless otherwise noted above.

[Kazu Sakamoto (JJ1WTK) qga02014@niftyserve.or.jp]

RS-10: Still operating normally for ZS6AOP. The usual regular stations are often found working thru the satellite as well as the "odd" new comer. Reports of copying the beacon while well below the horizon, over the South Pole on south-to-north passes with good signal strengths have been coming in. Hopefully, with more stations becoming active there will be some real long distance sub-horizon contacts soon. [ZS6AOP]

RS-12: RS-12 is currently operating in Mode K. The uplink passband is 21.210 - 21.250 MHz with downlink on 29.410 - 29.450 MHz. The transponder is non-inverting USB or CW, i.e., if you are on 21.225, then listen on 29.425 +/- the doppler shift, adjust your transmit frequency as you work the satellite to keep the downlink frequency constant. The beacon frequencies are 29.408 MHz or 29.454 MHz. The Robot operates on 29.454 MHz. The uplink frequency for the the Robot is 21.129 MHz. When the Robot is not operating, this frequency pair can also be used for general QSOs.
[KB8FGC @ KC8TW.#swoh.usa.na]

A0-21: This OSCAR sends down beautiful signals, 59+ signals about 90% of the time. Along with DOVE, ZS6AOP can recommend A0-21 to anyone who wants to start capturing and examing telemetry using basic equipment. [ZS6AOP]

A0-16: Operating normally. [WH6I]

L0-19: Operating normally. [WH6I]

I0-26: Operating normally. [WH6I]

K0-23: Operating normally. [WH6I]

K0-25: Operating normally. K0-25 has a number of new earth images this past week. So far WH6I notes that he has not seen any pictures that were particularly interesting to him. [WH6I]

A0-27: There is no particular schedule transponder schedule per se, and the way it works is that amateur radio section of the satellite has only solar cell illumination to power it so as to not strain the drain of on board battery power on the commercial side. Therefore, if your using ITRACK OR QUICKTRACK watch the sun terminator (sun darkness line) when it crosses into the light, the Analog repeater turns on but not until it is in sunlight. N4OUL's own experience is that he has worked it with a hand held ICOM-2AT on low power 2.5 W into 4 el 2M antenna and was full quieting stateside. Also VE3BDR worked it with a portable low power with a mag mount. Uplink on 2M is FM at 145.850 MHz and downlink on FM at 436.800 MHz. [N4OUL]

The AMSAT NEWS Service (ANS) is looking for volunteers to contribute weekly OSCAR status reports. If you have a favorite OSCAR which you work on a regular basis and would like to contribute to this bulletin, please send your observations to WD0HHU at his CompuServe address of 70524,2272, on INTERNET at wd0hhu@amsat.org, or to his local packet BBS in the Denver, CO area, WD0HHU @ W0LJF.#NECO.CO.USA.NOAM. Also, if you find that the current set of orbital elements are not generating the correct AOS/LOS times at your QTH, PLEASE INCLUDE THAT INFORMATION AS WELL. The information you provide will be of value to all OSCAR enthusiasts.

/EX

Date: Sun, 13 Mar 1994 08:56:04 -0700
From: ihnp4.ucsd.edu!usc!sol.ctr.columbia.edu!newsxfer.itd.umich.edu!
nnnp.cs.ubc.ca!alberta!ve6mgs!usenet@network.ucsd.edu
Subject: ARLK010 Keplerian data
To: ham-space@ucsd.edu

SB KEP @ ARL \$ARLK010
ARLK010 Keplerian data

ZCZC SK77
QST de W1AW

Keplerian Bulletin 10 ARLK010

Date: 14 Mar 1994 10:14:45 GMT
From: ihnp4.ucsd.edu!swrinde!emory!news-feed-2.peachnet.edu!concert!
bigblue.oit.unc.edu!samba.oit.unc.edu!not-for-mail@network.ucsd.edu
Subject: new stsplus??
To: ham-space@ucsd.edu

In article <763551401snz@isis.demon.co.uk>,
Ian Smith <ian@isis.demon.co.uk> wrote:
>In article <BE7sY6c.brunelli_pc@delphi.com> brunelli_pc@delphi.com writes:
>
>>I have heard a few rumors about SOP94???, and that it tracks
>>multiple sats. Any info on validity, ftp availability,
>>or otherwise would be grealyly appreciated

Pete, the main thing you need to know about the program is that it
works best with a math co-processor and/or a fast cpu, 20 MHz or
higher. It is an excellent, well written program for tracking satellites.

>>thanks
>>
>>pete brunelli
>>n1qdq
>>
>

>I thought that STSPLUS had tracked multiple sats since version 9333.
>Having said that, there appears to be several new versions per year,
>so a 94?? has probable appeared. For some reason, STSPLUS has always
>been hard to get via FTP. The BBS is the best place and CIS appears
>to be kept up to date. FWIW the latest I've seen is 9353.
>
>Regards
>Ian.

I recently saw version 9405 on a local Fidonet bbs where I hang out.
The archive date is 280194. The author of STSPLUS dates his releases
by the year (94) and the week (05) of release.

I will check to see if it is on any ftp sites.

--
timothy.satterfield@bbs.oit.unc.edu KD4MYN KD4MYN@KB4WGA.#NC.USA.NA
timothy.satterfield@psybbs.durham.nc.us 1:3641/1.740
tsatterf@nyx10.cs.du.edu A part of the solution, not the problem.

Near the Durham County Hospital in beautiful, downtown Braggtown, NC.

--

 \ The above does not represent OIT, UNC-CH, laUNCHpad, or its other users. /

Date: Mon, 14 Mar 1994 04:33:29 GMT
From: netcomsv!netcom.com!astroman@decwrl.dec.com
Subject: STS-62 Orbital State Vectors Rev #148 (pre-OMS3)
To: ham-space@ucsd.edu

(Note: OMS-3 Burn Scheduled for MET 9/16:45 or 0038 CST (3/14/94))

Vector format = 117
Satellite Name: STS-62
Catalog Number: 23025 94015A
Epoch Date/Time: 94072.83620737269
03/13/1994 20:04:08.317 UTC
EFG E: -148638.31 ft
F: -21512812.23 ft
G: -4199104.29 ft
Edot: 18511.3019 ft/s
Fdot: 2832.2320 ft/s
Gdot: -15206.2017 ft/s
ndot/2 (drag): 0.00001260000 rev/day^2
nddt/6: 5.29550E-06 rev/day^3
Bstar: 9.15760E-06 1/Earth Radii
Elset #: 21
Rev @ Epoch: 148.54909713854

MSDOS/PC software is available for conversion of
OSV to 2 Line Keplerian Elements via ftp to:
oak.oakland.edu:/pub/msdos/hamradio/v219331.zip
and the SIMTEL archives.

State Vectors courtesy Ken Ernandes N2WWD

SM

Date: Sun, 13 Mar 94 12:54:19 PST
From: ihnp4.ucsd.edu!usc!elroy.jpl.nasa.gov!nntp-server.caltech.edu!
mustang.mst6.lanl.gov!newshost.lanl.gov!usenet@network.ucsd.edu
Subject: Tokyo HiPower HL-90U Amp
To: ham-space@ucsd.edu

Recently I have aquired a THP HL-90U amplifier with it I got a schematic drawing only no other docs. I would love to aquire both the owners manual and service manual. Actually I would be happy with anything. The usual offer to compensate for copying mailing etc applies.

Date: (null)
From: (null)
SB KEP ARL ARLK010
ARLK010 Keplerian data

Thanks to NASA, AMSAT and N3FKV for the following Keplerian data.

Decode 2-line elsets with the following key:

1 AAAAAU 00 0 0 BBBB.BBBBBBBB .CCCCCCC 00000-0 00000-0 0 DDDZ
2 AAAAA EEE.EEEE FFF.FFFF GGGGGGG HHH.HHHH III.IIII JJ.JJJJJJJKKKKKZ
KEY: A-CATALOGNUM B-EPOCHTIME C-DECAY D-ELSETNUM E-INCLINATION F-RAAN
G-ECCENTRICITY H-ARGPERIGEE I-MNANOM J-MNMOTION K-ORBITNUM Z-CHECKSUM

AO-10

1 14129U 83058 B 94069.18379542 -.00000210 10000-3 0 2684
2 14129 27.1934 337.9178 6022504 160.8947 238.2860 2.05878778 52779

RS-10/11

1 18129U 87054 A 94067.01740430 0.00000036 22615-4 0 8807
2 18129 82.9209 43.6165 0010632 312.3195 47.7057 13.72332558336038

UO-11

1 14781U 84021 B 94067.56924816 0.00000314 61190-4 0 6729
2 14781 97.7916 86.9836 0010793 229.7625 130.2638 14.69163339535534

RS-12/13

1 21089U 91007 A 94067.45619162 0.00000044 30495-4 0 6705
2 21089 82.9185 86.1590 0030648 31.0404 329.2549 13.74036632154815

AO-13

1 19216U 88051 B 94069.54851579 -.00000456 10000-4 0 8925
2 19216 57.8718 263.9681 7210511 336.6114 2.6497 2.09726483 12443

UO-14

1 20437U 90005 B 94067.73687474 0.00000061 40486-4 0 9725
2 20437 98.5922 153.8649 0011592 122.8019 237.4277 14.29828748215238

AO-16

1 20439U 90005 D 94067.72631072 0.00000054 37964-4 0 7726
2 20439 98.6003 154.9835 0011895 123.8347 236.3959 14.29883809215246

DO-17

1 20440U 90005 E 94067.27061045 0.00000070 44036-4 0 7710
2 20440 98.6012 154.8241 0012085 124.8077 235.4243 14.30022491215195

WO-18

1 20441U 90005 F 94067.73395059 0.00000053 37414-4 0 7732

2 20441 98.6000 155.2882 0012520 123.5482 236.6892 14.29998053215264
 L0-19
 1 20442U 90005 G 94069.25806460 0.00000090 42470-4 0 7497
 2 20442 98.6006 157.0275 0013027 119.1463 241.1023 14.30092955215490
 F0-20
 1 20480U 90013 C 94067.40210310 -.00000055 -49320-4 0 6679
 2 20480 99.0229 238.3245 0540340 207.7414 149.3880 12.83223761191206
 A0-21
 1 21087U 91006 A 94069.83595116 0.00000094 82657-4 0 4438
 2 21087 82.9370 215.4726 0036191 0.5572 359.5617 13.74535665156075
 U0-22
 1 21575U 91050 B 94067.16659976 0.00000088 44344-4 0 4735
 2 21575 98.4399 143.6682 0006939 228.7234 131.3361 14.36896892138577
 K0-23
 1 22077U 92052 B 94067.55219489 -.00000037 10000-3 0 3689
 2 22077 66.0788 130.6842 0011228 312.6441 47.3631 12.86285294 73847
 K0-25
 1 22830U 93061H 94067.68367155 0.00000069 45175-4 0 2725
 2 22830 98.5652 142.8126 0012170 107.8757 252.3739 14.28038885 23353
 I0-26
 1 22826U 93061 D 94068.07086926 0.00000012 22619-4 0 2690
 2 22826 98.6625 144.8782 0009958 137.9486 222.2467 14.27713554 23404
 A0-27
 1 22825U 93061 C 94067.73218374 -.00000005 15777-4 0 2695
 2 22825 98.6625 144.5201 0009388 138.6898 221.4999 14.27610714 23357
 PoSat
 1 22829U 93061 G 94068.17748386 0.00000070 46048-4 0 2628
 2 22829 98.6568 144.9950 0010522 125.3851 234.8327 14.28009726 23423
 STS-59
 1 99959U 94097.74947238 0.00221188 11303-3 0 76
 2 99959 57.0053 276.3038 0009259 269.9963 90.0094 16.19806752 53
 STS-62
 1 23025U 94015 A 94069.91666667 0.00001260 52955-5 91576-5 0 170
 2 23025 39.0142 207.1724 0005680 323.6151 50.6703 15.90477421 1019
 Mir
 1 16609U 86017 A 94070.24194089 0.00048719 63440-3 0 1700
 2 16609 51.6441 317.2746 0014925 20.9171 339.2181 15.58120678460770

Keplerian bulletins are transmitted twice weekly from W1AW.
 The next scheduled transmission of these data will be Tuesday,
 March 15, 1994, at 2330z on Baudot and AMTOR.

NNNN
 /EX

End of Ham-Space Digest V94 #57
